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Batteries + Jumpercables = DC Welder

By TimAnderson (/member/TimAnderson/) in Workshop (/workshop/) > Tools (/workshop/tools/) 256,045 403 101 Featured



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About: Tim Anderson is the author of the "Heirloom Technology" column in Make Magazine. He is co-founder of www.zcorp.com, manufacturers of "3D Printer" output devices. His detailed drawings of traditional Pacific... More About

Here's the simplest welder you can make.
It's just a pair of jumper cables and a welding rod.
Oh yeah. And some batteries to power it.
I happened to have some nice juicy batteries in the form of a Golf Cart.

Here's me welding a trailer hitch with 1/8" 6011 rods. Welding current peaks at around 140-150 amps with these rods and around 120 amps with 3/32 6013 rods according to a Fluke 1010 clamp probe.

Greatly inspired by South Africans [battery-welding their landrovers](http://www.lcool.org/technical/80_series/bat_weld/battery_welding.html).
(http://www.lcool.org/technical/80_series/bat_weld/battery_welding.html).
More [battery welders](http://www.fieldlines.com/story/2006/5/8/6559/50626) (<http://www.fieldlines.com/story/2006/5/8/6559/50626>).
Also check out this great [homemade AC stick welder](https://www.instructables.com/id/Build-a-Microwave-Transformer-Homemade-Welder/)
(<https://www.instructables.com/id/Build-a-Microwave-Transformer-Homemade-Welder/>).

Oops! Almost forgot a warning. DON'T ELECTOCUTE, BURN, OR BLIND YOURSELF.
DON'T BREATHE THE FUMES OR DETONATE YOUR BATTERIES.
That said, read the specs for your battery. Big ones are designed to produce enough current for welding. Don't let the nay-sayers keep you from trying it. Check your batteries and don't overheat them. Lead-acid batteries can go into a thermal-runaway self-discharge mode.

Action photos by [Andrea](https://www.instructables.com/member/seedlingproject/) (<https://www.instructables.com/member/seedlingproject/>), video by Pete Lynne.



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Step 1: Cables and Rod



Here's the stuff.

The jumper cables were \$12 from Harbor Freight.

The strip of bicycle innertube is optional, to wrap the end of an alligator clip and make it grip harder.

If you're feeling fancy you can replace one of your alligator clips with an electrode holder.

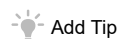
This nice one was made in India and cost \$7 from Harbor Freight.

The welding rods I tried are 3/32" 6013 and 1/8" 6011, 5lbs for \$6 or so. Available in Africa, S.America, anywhere.

You'll also want to wear gloves,

and a welding helmet, \$16 from [Northern Tool](http://www.northerntool.com)

(http://www.northerntool.com/webapp/wcs/stores/servlet/product_6970_200305009_200305009).



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Step 2: Alligator Clip Orthodontics




Bend the alligator clip's incisors forward so the canines can grip the rod properly as seen in the 2nd photo.

Strengthen the alligator's jaw muscles with a wrapping of bicycle innertube strip.



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Step 3: Batteries!



My golf cart has 6 of these 6 volt T-105 size batteries that I bought used from THE GUY WHO MADE THEM!!!

They're in series making 36 volts total. I can clip in anywhere in the chain to get 36,30,24, etc. volts.

The batteries have about 220 Amp-hours capacity, so that means I could weld at 150 amps for more than an hour (consult books printed on paper for the details) without recharging. Plenty good since I'll never have a project with enough metal laid out ahead of time to spend that much time a-welding in a day.

If your batteries aren't as nice as this, don't worry, you can do plenty of welding with three old car batteries in series.

I got these from the guy who made them?

That's right, a family run battery manufacturer right in Sausalito in a little workshop.

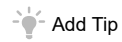
It's really amazing, like an old time blacksmith's shop, but high-tech. They can make any size battery.

Alrick, the proprietor, grew up making batteries and he really knows his stuff.

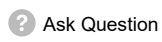
He sells batteries to all the big boats there, and he knows exactly how long every brand of battery lasts in every set of conditions.

Don't bother him about your electric car though, he's been plagued about that sort of thing enough already.

Arc battery company
90 gate 5 rd. sausalito ca 94965
415-332-3272



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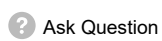
Step 4: Welding Tests



I welded on 1/4" thick cold-rolled mild steel plate.
I used DC reverse-polarity at 36,30, and 24 volts.
I used 1/8" 6011 rod and 3/32" 6013 rod



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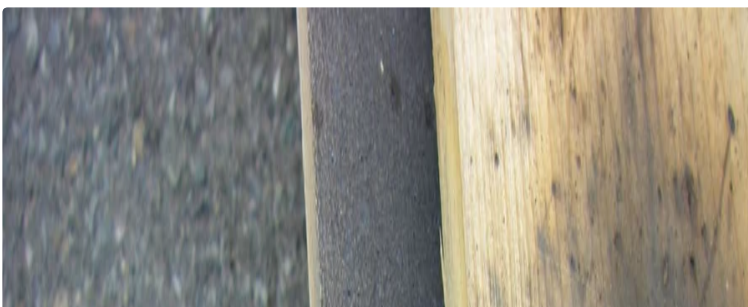
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Step 5: The Welds





A short arc but very hot. It melted deep and fast into the 1/4" plate.
I couldn't have stuck the rod to the plate if I wanted to.

These are the welds after chipping and brushing the slag off.

I did the right hand weld first with 1/8" 6011 rod at 36 Volts.

I've had the rods for a while and they're a bit damp and splattered a lot.

It's a deep good weld as you can see in the next photo of the backside of the plate, where it's melted through.

The mess at the top of the middle weld is trying a 6011 at 24 volts. Not enough juice, a lot of splattering. The full length bead next to it is a 6011 at 30 volts.

The left hand weld, the best looking one, is a 3/32" thick 6013 rod at 30 volts.

This golf cart is a good welder and I will definitely use it to weld projects in the future.



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Step 6: Arc Stabilizer and Stinger





Thanks to readers who recommended putting an inductor in series, called an "arc stabilizer".

Zan (<https://www.instructables.com/member/ZanA/>), and I made one from a transformer we scavenged from a dead microwave oven. We used [this method](https://www.instructables.com/id/SSOXF48FAKC0MQT/) (<https://www.instructables.com/id/SSOXF48FAKC0MQT/>), to chop out the secondary and wind 20 turns of 10-gauge wire, which is all that would fit.

We left the primary intact, it doesn't affect the function here. An inductor gives the current "momentum" to blast through bits of flux and rust that get in the way. The arc sputters a lot less, welding is easier, and the welds are better.

I got a great Indian-made stinger (electrode holder) for \$6 from [harborfreight](http://www.harborfreight.com/cpi/ctaf/displayitem.taf?Itemnumber=47908) (<http://www.harborfreight.com/cpi/ctaf/displayitem.taf?Itemnumber=47908>), and replaced one of the jumper cable clamps with that.

Then I welded some repairs on this very badly rusted boat trailer. Too pitted to grind clean very well. I used 1/8" 6011 rod at 36 volts and it was fabulous. I melted good deep welds into all that rusty metal. Very satisfying.

We've got a self-propelled welder!

Step 7: Cutting Steel With a Stick Welder





The bumper hitch on my 1978 Toyota truck was rusted rotten.

Ray (<https://www.instructables.com/member/Tangerinepiggy/>), and I used the golfcart welder with 1/8" 6011 rods to weld some beefy reinforcements on it.

The big toroidal series inductor seen here came from [www.accrc.org/ ACCRC] Maker Day. I should put a few dozen more turns on it to really smooth out the arc. We did some strong agricultural-style welding that isn't going to break or appear in textbooks.

Here's Ray (<https://www.instructables.com/member/Tangerinepiggy/>), cutting holes for the trailer safety chain to hook on.

We dipped the rods in water and then blasted and pushed the steel out of the way. It works well and makes a surprisingly clean hole while using less rod than you'd think. Thanks to a reader who suggested dipping the rods in water- I can't find your comment now, what other nifty tricks do you have up your sleeve?

I also tried an improvised air-arc torch using compressed air. It didn't work at all. The air blast blew the arc away, chilled and froze the molten metal instead of burning it. I guess that's why air-arc cutting torches use 500 amps or more